

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: KIM, Seok Koo et al.)
Serial No. 10/551,946) Group Art Unit: 1795
Filed: October 5, 2005)) Examiner: Martin,
For: CONSTITUTION OF THE DISPERSANT IN THE)) Angela J.
PREPARATION OF THE ELECTRODE ACTIVE))
MATERIAL SLURRY AND THE USE OF THE)) Confirmation No.: 3418
DISPERSANT))
)

VIA EFS

Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Sir:

In response to the Final Office Action dated September 18, 2009, and the Advisory Action dated January 11, 2010, and in conjunction with the Notice of Appeal and Petition for Revival of an Application for Patent Abandoned Unintentionally filed concurrently herewith, the Applicants submit the following remarks in support of the Pre-Appeal Brief Request for Review.

REMARKS

Claims 1-12 are pending in the present Application. The present submission is responsive to the Final Office Action of September 18, 2009, in which claims 1-12 are currently rejected. Reconsideration is respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-12 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over KR1020000014672 (“Kim”) in view of U.S. Patent No. 6,287,723 B1 (“Maeda”). The Examiner states that Kim does not teach a dispersant as claimed by the Applicants and states that Maeda teaches a dispersant having a polyethylene oxide or polyvinylidene fluoride polymer backbone and a side-chain nonionic surfactant. Final Office action dated 09/18/2009, p. 3-5. Applicants respectfully traverse this rejection for at least the following reasons.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

The Applicants disclose that an electrode active material slurry comprising a styrene-butadiene-based polymer resin binder and a cellulose-based or an acrylate-based resin thickener does not provide sufficient dispersion of the electrode active material (i.e., a carbon based electrode active material). See Specification, p. 3, line 19 to p. 3, line 30. The Applicants disclose that use of “a dispersant comprising a polymer backbone capable of physically bonding ... to the surface of carbon [and] a side-chain having surfactant properties required for dispersion, in the same molecule” provides sufficient dispersion. Specification, p. 6, lines 28-32, emphasis added. Accordingly, claim 1 recites, *inter alia*, “a dispersant

comprising a polymer backbone capable of surface-adsorption and a side-chain having non-ionic surfactant properties.”

Kim discloses method of manufacturing a lithium ion battery which comprises mixing a styrene butadiene rubber (SBR) binder, a carbon active material, a binder (which may be cellulosic, such as carboxymethylcellulose, CMC), and water. Kim, e.g., paragraph [18].

Maeda discloses an anode binder for an alkaline battery comprising an emulsion polymer (Col. 5, lines 47-62), which is prepared from nonionic monomers. Maeda, col. 3, line 43 to col. 4, line 10. Maeda states that a polymer rich in an ionic monomer is not used in the invention of Maeda because of an undesirable reaction with the electrolyte (Maeda, col. 4, lines 16-21) and states that if desired, ionic monomers can be used. Maeda, col. 4, lines 23-28. Maeda further teaches that the nonionic polymers prepared by emulsion polymerization of the monomers include homopolymers and copolymers of these monomers. Maeda, col. 5, lines 47-52) Maeda also teaches nonionic surfactants (e.g., polyoxyethylene alkyl ether). Maeda, col. 2, line 59 to Col. 3, line 8.

First, neither Kim nor Maeda, either alone or in combination, disclose a dispersant comprising a polymer backbone capable of surface-adsorption and a side-chain having non-ionic surfactant properties, as recited in Claim 1. The Examiner admits that Kim does not disclose a dispersant. Maeda does not disclose incorporation of the nonionic surfactants disclosed in Maeda into the polymer chain of the emulsion polymer. Maeda discloses that a *nonionic polymer* anode binder is obtained by emulsion polymerization of at least one nonionic monomer in the presence of a nonionic surfactant. Maeda, Col. 2, lines 47-58, emphasis added.

Also, as is known in the art of emulsion polymerizations, these surfactants are dispersed in, but not attached to, the emulsion polymer. A nonionic polymer, when prepared by emulsion polymerization, forms emulsion particles, and a nonionic surfactant, when present, is dispersed in the resulting polymerization product of the nonionic monomer. Thus the nonionic surfactant and the polymerization product of the nonionic monomer would phase separate. Thus the nonionic surfactant of Maeda cannot be a side-chain of a polymer of the nonionic monomer. Therefore one of ordinary skill in the art would understand that Maeda teaches a mixture of an emulsion polymer with surfactants dispersed in it, and does not teach

that the disclosed surfactants are covalently attached by emulsion polymerization to the emulsion polymer chain as claimed in Claim 1. Thus Maeda does not disclose a dispersant as claimed by the Applicants. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989) (“Although the Commissioner suggests that [the structure in the primary art reference] could readily be modified to form the [claimed] structure, ‘[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification’”) (citation omitted).

Applicants therefore respectfully submit that Maeda does not teach a dispersant having a polymer backbone with a side-chain nonionic surfactant, and therefore Kim and Maeda fail to teach all elements of the instant claims, and fail to provide a suggestion or incentive that would lead one skilled in the art to so modify the combination.

Second, Maeda discloses that the amount of the anionic surfactant based on the total solid amount of surfactant should be not more than 10 wt%. Maeda, col. 3, lines 17-20. Applicants note however that the anionic surfactant is not disclosed or taught to be the same in Maeda as the nonionic surfactant of Maeda, col. 2, lines 56-67, and thus Applicants do not agree that this disclosure of the anionic surfactant in Maeda is relevant to the inclusion of a nonionic surfactant as a side chain as claimed in Claim 1. Maeda does not disclose the amount of nonionic surfactant used in the emulsion polymerization.

Third, Maeda discloses that the polymerization product of the nonionic monomer is a *binder*, which is distinct from a dispersant. Maeda discloses that the *binder* includes a polymer other than the above nonionic polymer, and discloses that a preferred example of the water-insoluble polymer is polyvinylidene fluoride (PVdF). Maeda, col. 6, lines 60-67 and col. 7, lines 1-4. Thus, Maeda discloses PVdF is a binder and does not suggest modifying a PVdF backbone to have a side chain of a surfactant.

Fourth, because Kim discloses a carbon anode active material for a lithium ion battery (Kim, [11], [14], [17]), and because Maeda discloses use of a hydridable alloy or a cadmium alloy anode for an alkaline battery (Maeda, col. 7, lines 55-56), one of ordinary skill in the art would not have been prompted to modify Kim in view of Maeda for at least the reasons that modifying Kim in view of Maeda would change the principle of operation of Kim and including the hydridable metal alloy of Maeda in the anode active material slurry of Kim

would render Kim unsuited to its intended purpose.

Fifth, Kim and Maeda do not suggest the unexpected results disclosed by the Applicants, including use of a dispersant to overcome the mismatch in density between the carbon-based anode active material and the binder. For example, Kim and Maeda do not suggest the improvement in viscosity disclosed by the Applicants (Specification, p. 12, line 30 to p. 13, line 18 and Figs. 3 and 4), or the improved cell performance disclosed by the Applicants. (see e.g., FIG. 6 which shows a sharper drop in charge/discharge rate for Comparative Example 2 without dispersant, but with CMC as a binder as disclosed in Kim, and Example 1, which includes both CMC and a dispersant as claimed)

Therefore, for at least the above reasons, the dispersant claimed in Claim 1 is not disclosed or suggested by Kim and Maeda, either alone or in combination because there is no suggestion that the surfactant of Maeda reacts to form a side chain off a polymer backbone to provide the dispersant of Claim 1, and hence Maeda fails to remedy the deficiencies of Kim. Further there is no suggestion to combine Kim and Maeda as each teaches the exclusion of the other. Therefore, the combination of Kim and Maeda does not disclose the anode active material slurry claimed in Claim 1, and its dependent claims, and the combination therefore does not render the instant claims unpatentable.

Applicants hereby petition for any necessary extension of time required under 37 C.F.R. 1.136(a) or 1.136(b) or any other necessary fees(s), which may be required for entry and consideration of the present Reply. If there are any additional charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,
CANTOR COLBURN LLP
Applicants' Attorneys

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